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No. 18

LICHENS[1]

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During the course of an expedition to the Galapagos Islands in 1932 and to Guadalupe Island in 1931, Mr. John Thomas Howell, botanist of the expeditions, made incidental collections of lichens to the extent of a little over fifty numbers, for the most part from the Guadalupe Island off the coast of Lower California and from the islands of the Revillagigedo group.

Among the families represented, excluding the *Rocellaceae* which are being studied by Professor O. V. Darbishire, members of the *Usneaceae* appear to be dominant. The family is represented by sixteen numbers which include eleven different species and among them are one species of *Alectoria*, seven species, one variety and one form of *Ramalina*, and two species of *Usnea*. The next largest family, so far as the number of species is concerned, is the *Physiaceae* which includes one new species of *Anaptychia* and six species of *Physcia*, in which genus one species is described as new. The third largest family is the *Parmeliaceae*, represented by eight numbers but with only one species of *Cetraria* and four species of *Parmelia*.

The remainder of the families are represented by from one to three species. Among these is the interesting species *Pertusaria bispora* (Farlow) Linder which, originally named *Pertusaria leioplara* f.

[1] Contribution from the Laboratories of Cryptogamic Botany of Harvard University, No. 130.

bispora by Farlow[2] but without a description, was listed from Tower Island of the Galapagos group. This second collection was made on Socorro Island, off the west coast of Mexico, nearly twenty degrees north of the type locality.

The systematic portion of this paper, which follows immediately, is arranged according to the system of Zalbruckner in the "Natürlichen Pflanzenfamilien."[3]

SPHAEROPHORACEAE

Sphaerophorus coralloides Pers.

Pine forest, Guadalupe Island, Lower California, November 15, 1931, *J. T. Howell* (34)[4]. Determined by Dr. D. N. Voigtlaender-Tetzner.

PYRENOPSIDACEAE

Psorotichia squamulosa Zalbr.

Summit of Clarion Island, June 28, 1932, *J. T. Howell* (20).

COLLEMACEAE

Leptogium mollucanum (Pers.) Wainio

Wafer Bay, Cocos Island, June 28, 1932, *J. T. Howell* (7). Determined by Dr. J. Lowe.

Leptogium sp.

Lower limits of forest above Braithwaite Bay, Socorro Island, March 27, 1932, *J. T. Howell* (8).

This specimen is sterile. The thallus, however, would seem to place the species near *L. mollucanum*.

LECIDEACEAE

Lecidea (Psora) **crenata** (Taylor) Nyl.

On cypress, Guadalupe Island, Lower California, March 17, 1932, *J. T. Howell* (5).

Although it is stated on the label that this specimen was growing "on cypress," the substratum is, in fact, reddish volcanic earth. There is apparently some doubt about the differences between this species and *L. decipiens;* for there is a fairly large series of both species which intergrade to such an extent as to cause Dr. Farlow to make a notation questioning the status of the species.

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[2] Farlow, W. G. in A. Stewart, Notes on the lichens of the Galapagos Islands. Proc. Calif. Acad. Sci. Ser. IV. 1:431-446. 1912.

[3] Zalbruckner, A. Lichens (Ascolichens, Hymenolichens), in Engler & Prantl, Die Natürlichen Pflanzenfamilien, 2nd ed. 8:61-263. *figs. 32-127.* 1926.

[4] The numbers cited in parentheses are those assigned by the writer.

Lecidea (Psora) **globifera** Ach.

Socorro Island, Revillagigedo Islands, March 26, 1932, *J. T. Howell* (6, 45). Although the collection is sterile, number 45 is tentatively assigned to this species.

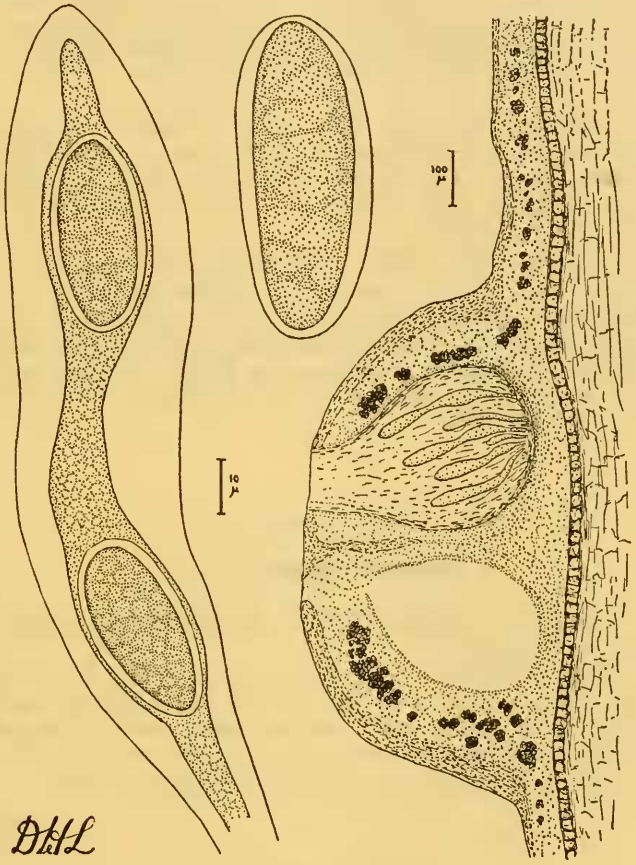

Fig. 1. *Pertusaria bispora* (Farlow) Linder. On the left an ascus with two immature ascospores. Note the extreme thickening of the ascus wall. Upper middle: a mature ascospore with definitely thickened lateral walls. On the right a section through a verruca showing two locules, the distribution of the algal symbionts, and the thin cortex which becomes thicker above the verruca.

PERTUSARIACEAE

Pertusaria bispora (Farlow) Linder, comb. nov.

Fig. 1; Plate 8, figs. 1 and 2.

Pertusaria leioplaca f. *bispora* Farlow (l. c.)

Thallus "Sea foam green" (Ridgway), laevis, demum parce fissuratus, KOH± laeviter lutescens; cortice supero exili; apotheciis 1-5 in verrucis irregulariter hemisphericis, disculis parvis, punctiformibus, indistinctis; paraphysibus tenuissimis,

ramosis; ascis 150 $\mu \pm$ longis, 30-38 μ latis; hyalinis, parietibus crassis, bisporis vel interdum unisporis; sporis 47-65 μ longis, 18.5-25.5 μ latis, ellipsoidalibus, laevibus hyalinisque.

Thallus "Sea foam green" (Ridgway), smooth, becoming sparsely fissured, KOH $\pm$ faintly yellowish, only the upper surface corticate and the cortex poorly developed; apothecia 1-5 in irregularly hemispherical elevated verrucae, the disc small, punctiform, indistinct; paraphyses slender (less than 1 μ), branching; ascis thick-walled, hyaline, about 150 μ long, 30-38 μ wide, 2-spored, occasionally 1-spored; spores 47-65 μ long, 18.5-25.5 μ wide, hyaline, smooth, ellipsoidal.

Galapagos Islands: Tower Island, on trunks and branches of *Bursera graveolens*, *Alban Stewart, 153*, type, in the Farlow Herbarium, and cotype in the Herbarium of the California Academy of Sciences, No. 119734. Revillagigedo Islands: Socorro Island, March 27, 1932, *J. T. Howell* (17).

In contrast with *P. leioplaca* which produces from four to eight spores in an ascus, and of which the thallus, according to Hasse[5], reacts positively to KOH, changing to yellow and then to pale violet, this species produces two spores, or occasionally one, in an ascus and gives but a faint yellowish reaction with KOH. The extended range of the plant would also indicate that this lichen is more than a local variant of *P. leioplaca*.

Lecanoraceae

Lecanora Hageni Ach.

On rocks, summit of Clarion Island, Revillagigedo Islands, March 23, 1932, *J. T. Howell* (38).

The apothecia of this specimen are larger than are those of the majority of the specimens in the Farlow Herbarium, especially of those occurring on rock, but it agrees with material occurring on wood. The spore sizes agree with those given for the species. The reaction with KOH is positive, the thallus turning yellow.

Parmeliaceae

Cetraria scutata Poetsch

Pine forest, Guadalupe Island, Lower California, November 15, 1931, *J. T. Howell* (3).

Parmelia conspersa (Ehrb.) Ach.

South end of Guadalupe Island, Lower California, November 16, 1931, *J. T. Howell* (9).

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[5] Hasse, H. E. The lichen flora of Southern California. Contrib. U. S. Nat. Herb. **17**(1):1-132. 1913.

Parmelia perforata (Wulf.) Ach.

Socorro Island, Revillagigedo Islands, March 27, 1932, *J. T. Howell* (10).

Parmelia perlata (L.) Ach.

Socorro Island, Revillagigedo Islands, March 26, 1932, *J. T. Howell* (13).

Parmelia physodes (L.) Ach.

Pine forest, Guadalupe Island, November 15, 1931, *J. T. Howell* (11, 14, 15); on cypress, Guadalupe Island, March 17, 1932, *J. T. Howell* (12); on the ground, Guadalupe Island, March 17, 1932, *J. T. Howell* (16). In specimen number 15, the laciniae are inflated and thus approach those of *P. enteromorpha* Ach.

USNEACEAE

Alectoria sarmentosa Ach.

Near the village, Chatham Island, Galapagos Islands, April 18, 1932, *M. Willows* (1).

Ramalina calicaris (L.) Fr.

Socorro Island, Revillagigedo Islands, March 27, 1932, *J. T. Howell* (21).

Ramalina calicaris var. **canaliculata** Fr.

Socorro Island, Revillagigedo Islands, March 27, 1932, *J. T. Howell* (22).

Ramalina ceruchis (Ach.) DeNot.

Pine forest, Guadalupe Island, Lower California, November 15, 1931, *J. T. Howell* (23, 24). Collection number 24 was mixed with *R. homalea* and was apparently growing with that species.

Ramalina ceruchis forma **cephalota** Tuck.

South end of Guadalupe Island, Lower California, November 16, 1931, *J. T. Howell* (25).

Ramalina combeoides Nyl.

South Bay, Cedros Island, August 17, 1932, *Templeton Crocker*, (26).

This specimen, which is fertile, shows variations in the thallus from smooth to shallowly concave-pitted, and from terete to slightly flattened. According to Howe[6], the southernmost range of this species is San Diego. This specimen therefore represents a southerly extension of the range.

Ramalina complanata (Sw.) Ach.

Summit of Clarion Island, Revillagigedo Islands, March 23, 1932, *J. T. Howell* (27).

Ramalina farinacea (L.) Ach.

On oak above Northeast Anchorage, Guadalupe Island, Lower California, November 14, 1931, *J. T. Howell*, (32).

So far as the writer has been able to ascertain, this species has not been reported south of Santa Monica, and Santa Cruz Island, California, hence it would appear that this specimen represents another southern extension of species range.

Ramalina homalea Ach.

San Nicolas Island, California, March 13, 1932, *J. T. Howell* (31, 33); pine forest, Guadalupe Island, November 15, 1931, *J. T. Howell*, (28, 29); south end of Guadalupe Island, November 16, 1931, *J. T. Howell*, (24, 30).

According to Howe (*l. c.*), Santa Barbara and San Diego are listed as the southernmost stations for this species.

Ramalina usneoides Fr.

Socorro Island, March 27, 1932, *J. T. Howell* (48).

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[6] Howe, R. H. North American Species of the genus Ramalina. The Bryologist **16**:65-74. 1913.

Usnea duriuscula J. Motyka

Pine forest, Guadalupe Island, Lower California, November 15, 1931, *J. T. Howell* (36).

Although this specimen is sterile, it agrees in thallus characters with material from Mexico which was determined by J. Motyka, and accordingly is so listed.

Usnea florida (L.) Web.

On oak above Northeast Anchorage, Guadalupe Island, Lower California, November 14, 1931, *J. T. Howell* (37).

Caloplacaceae

Caloplaca cirrochroa T. Fr.

On rocks, Clarion Island, Revillagigedo Islands, March 22, 1932, *J. T. Howell* (2).

This specimen, growing with *Physcia stellaris* (which see) and the following species, is sterile but its general appearance and the reaction of the thallus to KOH would indicate that it belongs here.

Caloplaca murorum (Hoffm.) T. Fr.

On rocks, Clarion Island, Revillagigedo Islands, March 22, 1932, *J. T. Howell* (2).

Theloschistaceae

Theloschistes flavicans Norm.

Pine forests, Guadalupe Island, Lower California, November 15, 1931, *J. T. Howell* (35). Determined by Dr. D. N. Voigtlaender-Tetzner.

Physciaceae

Anaptychia ciliatomarginata Linder, sp. nov.

Plate 8, figs. 3 and 4.

Thallus applanatus apice assurgens, usque 2-3 cm. radio, sursum albidus vel cinereo-albidus, infra albidus, laxe ramosus; laciniis angustis, raro 1.5 mm. latis, KOH+ luteis, utrinque corticatis, margine ciliatis, ciliis albis apice nigrescentibus;

apotheciis usque 3 mm. diametro, breve stipitatis, discis planis vel concavis, atris vel pruinosis, excipulis albis integris, externe longe ciliatis, hypotheciis hyalinis; paraphysibus 72-108 μ longis, 3-3.5 μ latis, simplicibus vel interdum apice breve ramosis, sursum fuscis, sensim inflatis et epithecium formantibus; ascis 48.5-75.5 μ longis, 9-14.5 μ latis, clavatis, monostichis vel irregulariter distichis, octosporis; sporis 14.5-16.5 μ longis (vel raro 12-18 μ longis), 7-8 μ latis, fuscis, ellipsoidalibus vel subinaequilateraliter ellipsoidalibus biloculariibus, parietibus crassis.

Thallus up to 2-3 cm. in radius, spreading, the tips ascending, whitish to grayish-white above, whitish below, loosely branching, the laciniae narrow, seldom more than 1.5 mm. broad, KOH+ yellow, corticate on both sides, the medulla KOH–, the margin ciliate with long fibrils which are white but become dark at the ends; apothecia up to 3 mm. in diameter, short-stipitate, the disc flat or concave, black or pruinose, the thalline exciple white and entire, the outer periphery long-ciliate; hypothecium hyaline; paraphyses 72-108 μ long, 3-3.5 μ wide, simple or occasionally short-branched at the apex where they are slightly inflated and fuscous; asci clavate, 48.5-75.5 μ long, 9-14.5 μ wide, 8-spored, monostichous or irregularly distichous; the spores 14.5-16.5 μ long (or rarely 12-18 μ long), 7-8 μ wide, ellipsoidal or subinequilaterally ellipsoidal, biloculate, thick-walled.

Type: Herb. Calif. Acad. Sci. No. 215010, co-type in Farlow Herb., Harvard University; south end of Guadalupe Island, Lower California, November 16, 1931, *J. T. Howell* (47).

This beautiful species resembles and is closely related to *A. erinacea* in its general lacy appearance, but differs from that species in its consistently lighter thallus, the narrower laciniae, and the long ciliations on the outer edge of the exciple, the last character suggesting the specific name. The spores also are somewhat smaller than those of *A. erinacea* since Herre[7] states that those of the latter species measure 15-23 μ long and 7.5-11 μ wide, and Hasse (l. c.) that they measure 16-32 μ long and 7.5-15 μ wide. *Anaptychia comosa,* although resembling this species in the ciliate margins of the thallus, lacks the ciliations on the outer periphery of the exciple. It may also be readily separated from this species by its much broader thallus which is conspicuously gray above.

Physcia adscendens Fr.

Physcia hispida var. *adscendens* Fr.

On oak above Northeast Anchorage, Guadalupe Island, Lower California, November 14, 1931, *J. T. Howell.*

Physcia aegilata (Ach.) Nyl.

Summit of Clarion Island, Revillagigedo Islands, March 23, 1932, *J. T. Howell* (18).

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[7] Herre, A. W. C. T. The lichen flora of the Santa Cruz Peninsula, California. Proc. Washington Acad. Sci. **12**(2):27-269. 1910.

Physcia aipolia (Ach.) Nyl.

On twigs and bark, Socorro Island, Revillagigedo Islands, March 27, 1932, *J. T. Howell* (44).

This specimen appears to be young and poorly developed. The margins of the few apothecia that are present in the specimen are minutely crenulate, and the thallus is colored below and gives rise to dark rhizoids, hence the specimen would appear to belong in this species.

Physcia (Euphyscia) **Howellii** Linder, sp. nov.

Plate 8, fig. 3.

Thallus parvus, usque 1-2 cm. radio, applanatus, sursum laevis, esorediatus, KOH+ luteus, irregulariter pauce ramosus, extremis rotundatis vel lobatis, infra albidus pauce rhizoidigerus, medulla KOH−; apotheciis usque 2.5 mm. diametro, sessilibus vel subsessilibus, discis planis vel laeviter concavis, atris; excipulis distincte crenatis; hypotheciis hyalinis; paraphysibus 60-70 x 2 μ, apice inflatis, 3.6 μ diam., fuscis et epithecium fuscum formantibus; ascis clavatis, 90 μ vel 99-128 μ longis, 27-35 μ latis, 2-8 sporis, monostichis vel irregulariter distichis; sporis ellipsoidalibus vel late rotundato-biconicis, 25 μ vel 28-32.5 μ longis et 12-14.5 μ latis (vel raro 11-16.5 μ latis) in ascis octosporis vel 29-34 μ longis et 18-20 μ latis in ascis bi- vel quadrisporis, uniseptatis raro unicellularibus, fuscis, parietibus crassis.

Thallus small, up to 1-2 cm. in radius, adnate, the upper surface smooth, esorediate, greenish or greenish-gray, KOH+yellow, irregularly few-branched, the ends rounded or lobate, the under side whitish with few concolorous rhizoids, medulla KOH−; apothecia up to 2.5 mm. in diameter, sessile or subsessile, the disc flat or slightly concave, black, the margin distinctly crenate; hypothecium hyaline; paraphyses 60-70 μ long, 2 μ wide, inflated and 3.6 μ in diameter at the tips where they are colored, forming a dark epithecium; asci clavate (90 μ or) 99-128 μ long, 27-35 μ wide, 2-8-spored, irregularly distichous or monostichous; spores ellipsoidal or broadly rounded, biconical, nonseptate or 1-septate, in the eight-spored asci 28-32.5 μ long, 12-14.5 μ wide, or rarely 25 μ long and 11-16.5 μ wide, or in the two or four-spored asci the spores 29-34 μ long and 18-20 μ wide.

Type: Herb. Calif. Acad. Sci. No. 215009, co-type in Farlow Herb., Harvard University; growing on bark among hepatics, lower limits of forest above Braithwaite Bay, Socorro Island, March 27, 1932, *J. T. Howell* (a).

The dimensions of the spores of this species immediately separate it from the related species such as *P. stellaris*, *P. aipolia*, *P. Leana*, and *P. crispa*. Because of its broad thallus it resembles the last three species, and because of the crenate margin of the exciple, the second and last species. From *P. aipolia*, it is separated by the pale under surface and the concolorous rhizoids, while only the large spores separate *P. Howellii* from *P. crispa*. There are other characters to be found in the thallus, but the writer hesitates to stress them, since the scanty type material does not allow sufficient observations on the range of variation to be found in this new species. Nevertheless, because of the spore-size and the distinctly crenate margin of the apothecium, the specimen is worthy of recognition under the new name.

Physcia picta (Sw.) Nyl.

Summit of Clarion Island, Revillagigedo Islands, March 22, 1932, *J. T. Howell* (19).

The reaction of the thallus to KOH is positive, the color changing to yellow and then to yellowish-green. The hypothallus is black, and the spores are 10-15 μ long and 5-7 μ wide.

Physcia stellaris Nyl.

Clarion Island, Revillagigedo Islands, March 22, 1932, *J. T. Howell* (2).

This specimen, growing on rock with *Caloplaca cirrochroa* and *C. murorum*, is somewhat doubtfully referred to this species since the thallus is somewhat broader than the usual forms and is less well developed. In contrast to these characters, which appear to be more or less variable in the species, the reaction to KOH is positive, and the spores measure 13.5-16 μ long and 5-7.5 μ wide.

Hymenolichens

Dictyonema sericeum (Fr.) Mont.

Dichonema sericeum (Fr.) Mont.

On wet slope near the summit of Indefatigable Island, Galapagos Islands, May 10, 1932, *J. T. Howell* (4).

This species has not hitherto been reported from the Galapagos Islands although it is not uncommon in tropical or subtropical countries.

The distribution and occurrence of the lichens of the Galapagos Islands has already been summarized by Stewart (l. c.) and hence little can be added by the writer, since among those specimens already listed above, only *Alectoria sarmentosa* from Chatham Island and *Dictyonema sericeum* from Indefatigable Island were collected in the Galapagos group. However, in order that the lichen flora of the more northern islands may be compared with that of the Galapagos, there follows a tabulated list of species arranged alphabetically according to genus and without regard to families.

	Guadalupe Island	*Cedros Island*	*Clarion Island*	*Socorro Island*
Anaptychia ciliatomarginata	+	−	−	−
Caloplaca cirrochroa	−	−	+	−
Caloplaca murorum	−	−	+	−
Cetraria scutata	+	−	−	−
Lecanora Hageni	−	−	+	−
Lecidea crenata	+	−	−	−
Lecidea globifera	−	−	−	+
Leptogium mollucanum ?	−	−	−	+
Parmelia conspersa	+	−	−	−
Parmelia perforata	−	−	−	+
Parmelia perlata	−	−	−	+
Parmelia physodes	+	−	−	−
Pertusaria bispora	−	−	−	−
Physcia adscendens	+	−	−	−
Physcia aegilata	−	−	+	−
Physcia aipolia	−	−	−	+
Physcia Howellii	−	−	−	+
Physcia picta	−	−	+	−
Physcia stellaris	−	−	+	−
Psorotichia squamulosa	−	−	+	−
Ramalina calicaris	−	−	−	+
R. calicaris v. canaliculata	−	−	−	+
Ramalina ceruchis	+	−	−	−
R. ceruchis f. cephalota	+	−	−	−
Ramalina combeoides	−	+	−	−
Ramalina complanata	−	−	+	−
Ramalina farinacea	+	−	−	−
Ramalina homalea[7]	+	−	−	−
Ramalina usneoides	−	−	−	+
Sphaerophorus corralloides	+	−	−	−
Theloschistes flavicans	+	−	−	−
Usnea duriuscula	+	−	−	−
Usnea florida	+	−	−	−

[7] Also collected on San Nicolas Island.

PLATE 8

Fig. 1. *Pertusaria bispora* (Farlow) Linder. Photomicrograph to show the one- to four-pored hemispherical verrucae, and the slightly fissured thallus. × 9.2.

Fig. 2. *Pertusaria bispora* (Farlow) Linder. Photograph to show the relatively even thallus and the distribution of the verrucae. × ¾.

Fig. 3. *Anaptychia ciliatomarginata* Linder, spec. nov. Photograph to show the manner of branching of the thallus and the elongate-ciliate margin of the slender laciniae. The under surface of the plant is shown by the lower specimen. × ¾.

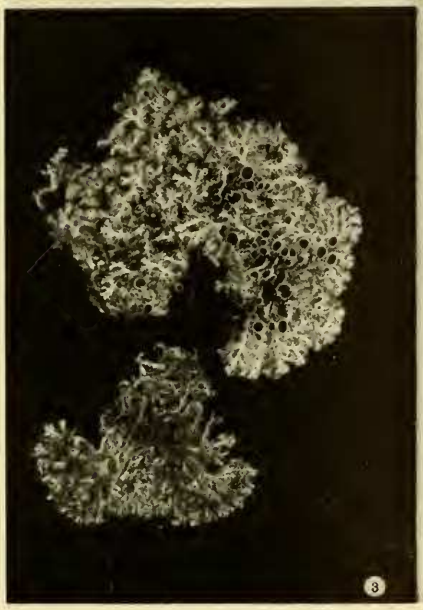
Fig. 4. *Anaptychia ciliatomarginata.* Linder, spec. nov. Photomicrograph to show more clearly the elongate cilia on the margins of the apothecia, and the black, slightly granulose surface of the disc. × 9.2.

Fig. 5. *Physcia Howellii* Linder, spec. nov. The upper specimen illustrates the characteristic type of branching of the thallus with its broad, inconspicuously lobed laciniae. × 2.5. The lower figure is a photomicrograph of a fruiting body to illustrate the crenulate margin of the apothecium. × 10.2.


1


2


5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